

## High Fidelity Tool for Noise Source Identification, Phase I

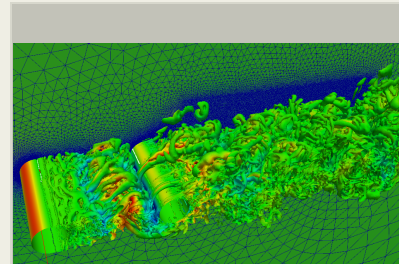
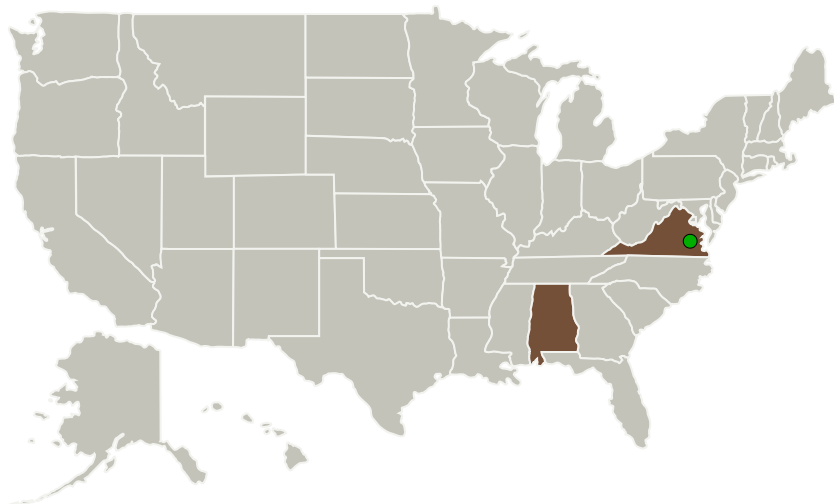
Completed Technology Project (2017 - 2017)



## Project Introduction

Thorough understanding of airframe and propulsion aerodynamic noise sources and the subsequent acoustic propagation to the farfield is necessary to the design and development of efficient, environmentally acceptable aircraft. In this SBIR study, we propose to develop a high fidelity tool using high-order low-dissipation methods in the NASA flagship unstructured CFD code FUN3D. The developed prediction tool can accurately represent the nonlinear flow processes with minimum dissipation, including turbulence, coherent vortices and shock waves critical to the noise generation. Compared to the state-of-the-art unstructured production codes, an increase of one order-of-magnitude in resolvable scales is expected at the expense of just 10% overhead. In Phase I, the effort will include improvement of the 3rd-order scheme for high-aspect ratio unstructured grids, and consistent temporal and spatial accuracies. High-order limiters will be developed to improve the shock capturing capability for sonic boom. The performance improvements will be assessed for the unsteady subsonic and supersonic flows. The Phase II effort will further mature and advance the technology utilizing FUN3D's massively parallel infrastructure to enable its applications for the prediction of airframe noise sources and the noise sources due to the aerodynamic and acoustic interaction of airframe and engines.

## Primary U.S. Work Locations and Key Partners



High Fidelity Tool for Noise Source Identification, Phase I Briefing Chart Image

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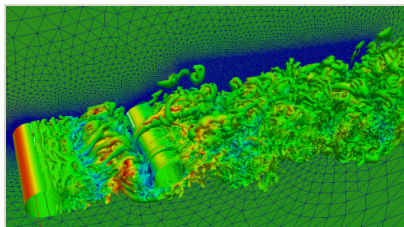
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Organizations Performing Work	Role	Type	Location
CFD Research Corporation	Lead Organization	Industry	Huntsville, Alabama
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
Alabama	Virginia

## Images

**Briefing Chart Image**

High Fidelity Tool for Noise Source Identification, Phase I Briefing Chart Image  
(<https://techport.nasa.gov/image/125811>)

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Organization:**

CFD Research Corporation

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

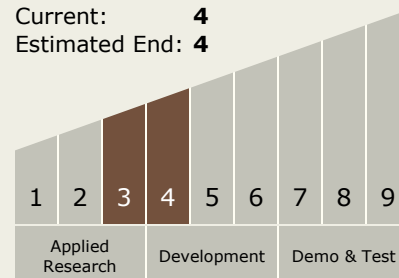
Carlos Torrez

**Principal Investigator:**

H Q Yang

## Technology Maturity (TRL)

Start: 3  
Current: 4  
Estimated End: 4



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## Technology Areas

### Primary:

- TX15 Flight Vehicle Systems
  - └ TX15.1 Aerosciences
    - └ TX15.1.4 Aeroacoustics

## Target Destinations

The Sun, Earth, The Moon,  
Mars, Others Inside the Solar  
System, Outside the Solar  
System